

Geointelligence Informs Darfur Policy

Spatial data have corroborated refugee descriptions of state-sponsored violence in Sudan's Darfur region, educating the international community about the crisis and spurring the United States to label it genocide.

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This is the first time satellite imagery has been so openly used as a foreign policy tool," said Andrew Natsios, administrator of the U.S. Agency for International Development (USAID), during an American Association for the Advancement of Science (www.aaas.org) forum about the humanitarian crisis ravaging the Darfur region of Sudan.

Although geointelligence cannot provide tangible relief to displaced Darfuris, it can influence policy, educating decision makers and reminding governments that the world is watching their actions. It can also help aid workers locate existing refugee camps, select sites for new camps and food distribution, and quantify human impacts almost too great to comprehend.

The hostilities in Darfur have left 3.2 million people in need of humanitarian assistance, according to the United Nations (UN), and threaten still more. In the past two-and-a-half years, as many

as 400,000 men, women, and children have died from malnutrition, disease, and acts of violence. The complex conflict is not religious in nature —

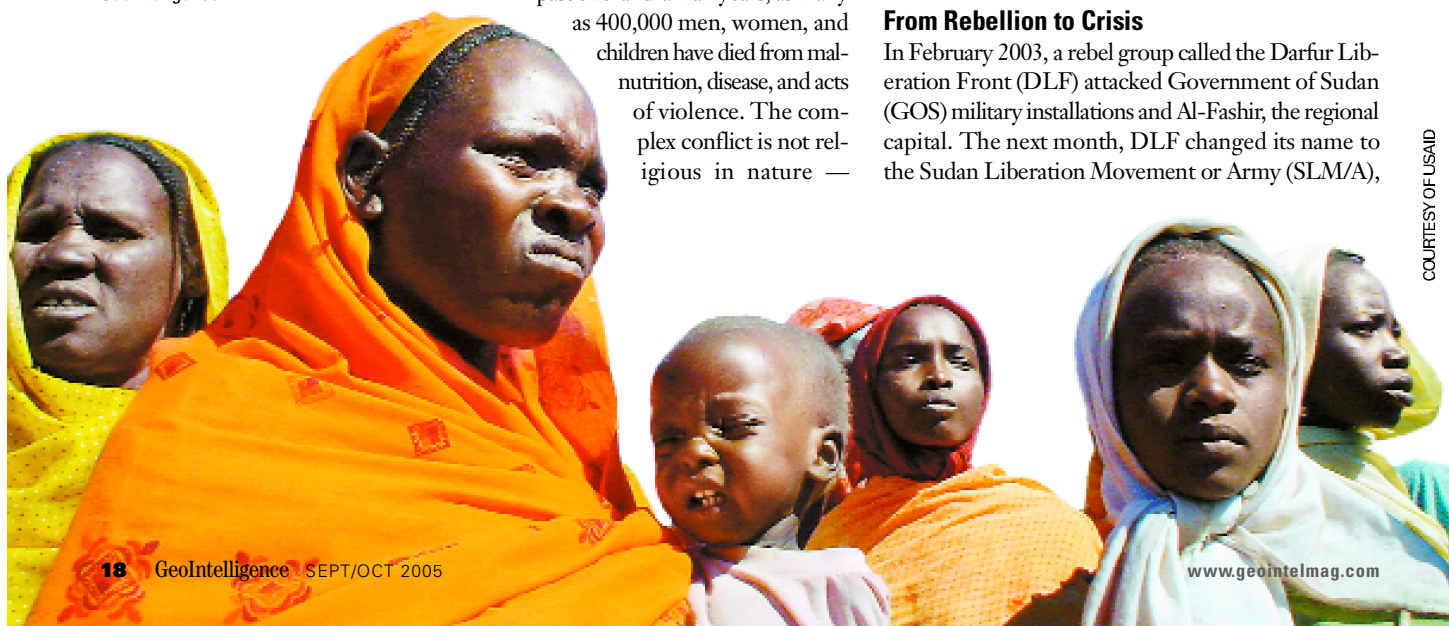
those involved are predominately Sunni Muslim — but rather political, economic, cultural, and ultimately, ethnic. The government-sponsored militia, or Janjaweed, are Arabs; the civilians suffering atrocities at their hands are non-Arab blacks, mostly of the Fur, Zaghawa, and Massalit ethnic groups (see Figure 1). Such an ethnic division may be confusing to outsiders, because intermarriage has made the Arabs and non-Arabs increasingly similar in appearance.

Conflict between the rival groups is not new: nomadic Arab herders and sedentary non-Arab farmers have clashed for hundreds of years over access to scarce land and water resources. Persistent drought has intensified this competition, as has the increasing desertification that drives herders ever farther south in search of grazing land. The decline of traditional tribal negotiation methods and the increasing prevalence of modern weaponry have also made the conflicts much more deadly than in the past.

From Rebellion to Crisis

In February 2003, a rebel group called the Darfur Liberation Front (DLF) attacked Government of Sudan (GOS) military installations and Al-Fashir, the regional capital. The next month, DLF changed its name to the Sudan Liberation Movement or Army (SLM/A),

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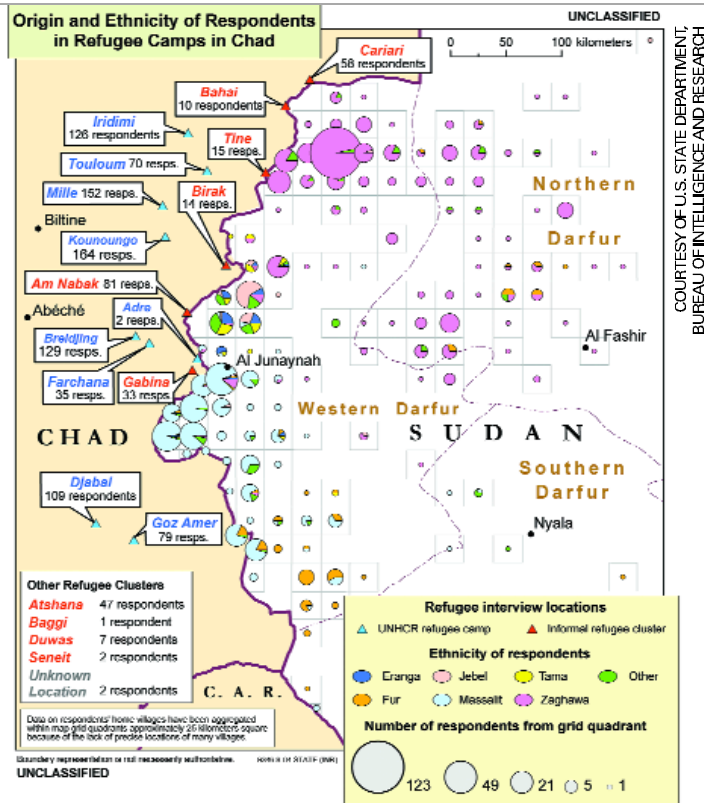
and its Secretary General Minni Arkou Minnawi announced the group's intention to create "a united democratic Sudan on a new basis of equality." In April, SLM/A struck the Al-Fashir airport, destroying GOS aircraft and killing government officers and policemen. The rebels claimed to be motivated by increasing militancy on the part of Arab tribes and the Khartoum-based government's oppression of non-Arabs. A smaller rebel group, the Justice and Equality Movement, has joined SLM/A in several attacks on GOS.

The President of Sudan, Omar al-Bashir, reacted to the uprising by enlisting the Janjaweed, an Arab militia, to destroy the rebels. Soon, the Janjaweed were attacking not just rebels but also civilians, whom the militia claimed were aiding the insurrection.

In a matter of months, the conflict degenerated into genocide; civilians were slaughtered on the basis of ethnicity, not whether they supported the rebels' cause. Refugee camps in Sudan and neighboring Chad swelled with displaced villagers fleeing beatings, looting, killings, the destruction of their homes, and rape. A report prepared for USAID, "The Use of Rape as a Weapon of War in the Conflict in Darfur, Sudan," describes rape's role in a genocidal campaign: "the Janjaweed often berated the women, calling them slaves, telling them that they would now bear a 'free' child, and asserting that they (the perpetrators) are wiping out the non-Arabs."

The Janjaweed militia is not only armed and backed financially by the Sudanese government, it is also joined by the GOS military in raids. GOS troops in pickup trucks have attacked villages side by side with Janjaweed militiamen mounted on horses and camels. Government troops firebomb villages with barrels of gasoline, forcing panicked villagers out of their homes so the militia can kill and loot more easily. Kenneth Roth, executive director of Human Rights Watch, said "The Janjaweed are no longer simply militias supported by the Sudanese government. These militias work in unison with government troops, with total impunity for their massive crimes."

Janjaweed, a word used to describe bandits or highwaymen, is an Arabic term meaning "man with a horse and gun." It can also be translated as "devils on horseback." In its June 2005 newsletter, the Embassy of Sudan asserted that "Before this tragedy [the term] had no ethnic or racial significance. . . . Part of the recent propaganda campaign has been to give this term a new dimension, confined to Arab nomads in the region who are deliberately provoked by the rebels (by stealing their livestock) to focus their wrath against the



tribes the rebels are drawn from. This is how burning, looting, and other crimes have been committed."

GOS officials have repeatedly denied responsibility for the Janjaweed, dismissing attacks on civilians as scattered incidents of banditry and calling charges of genocide propaganda. Beginning last year, an interagency, two-pronged campaign set out to ascertain the facts through collection of interviews and imagery. "The Sudanese government wouldn't let us in to document the atrocities, but we were still watching," said David Springer, a National Geospatial-Intelligence Agency (NGA) geospatial intelligence analyst working in the U.S. State Department's (www.state.gov) Humanitarian Information Unit (HIU).

It was thanks to these efforts — and the undeniable evidence provided by remote sensing and geographic information systems (GIS) — that the United States declared the situation to be genocide and began pressing the United Nations to investigate human rights violations in Darfur.

Documenting Atrocities

The State Department's Bureau of Democracy, Human Rights, and Labor (DRL) assembled an Atrocities Documentation Team to determine, through refugee interviews, the nature and location of the attacks on civilians. Experts from DRL, the American Bar Association, USAID, and the State Department's Bureau of Intelligence and Research (INR), as well as those

▲ **FIGURE 1.** Although dozens of ethnic groups inhabit Darfur, most occupants of refugee camps in Chad — and most of the Janjaweed's victims — are of the Fur, Zaghawa, and Massalit groups.

THE G-WORD

On September 9, 2004, Secretary of State Colin Powell, who had recently traveled to Darfur, spoke at a Senate Foreign Relations Committee hearing on Sudan. Ever since the Genocide Convention committed signatories to “undertake to prevent and to punish” the crime in 1948, U.S. government officials have been leery of using the term to define any particular conflict. That day, Powell became the first senior U.S. official ever to deliver a formal finding of genocide to Congress.

“When we reviewed the evidence,” Powell said, “we concluded that genocide has been committed in Darfur and that the Government of Sudan and the [Janjaweed] bear responsibility — and genocide may still be occurring.” Powell cited the State Department’s “Documenting Atrocities in Darfur” report and noted “a consistent and widespread pattern of atrocities (killings, rapes, burning of villages) committed by [Janjaweed] and government forces against non-Arab villagers.”

When questioned about UN Security Council Resolution 1556, Powell admitted that “no specific action in the form of sanctions” would be triggered by GOS’s failure to disarm the Janjaweed within the 30 days specified in the resolution. He did, however, call for a UN investigation into “all violations of international humanitarian law and human rights law that have occurred in Darfur, with a view



COURTESY OF U.S. STATE DEPARTMENT

Colin Powell based his conclusion of genocide in part on the State Department’s atrocities report, which included satellite imagery.

to ensuring accountability.” Powell also noted that “Sudan is a contracting party to the Genocide Convention and is obliged under the Convention to prevent and to punish acts of genocide.”

Some have questioned the value of Powell’s finding, doubting the impact the label of genocide has on the crisis or decrying it as sensationalistic. Sudan scholar and analyst Eric Reeves wrote that “none of this would be more than a debate about nomenclature if a finding of genocide did not hold the potential to dictate the need for humanitarian intervention in Darfur . . . Genocide should not, of course, be the threshold for humanitarian intervention; but in the world as we find it . . . the g-word has come increasingly to constitute a ghastly gold standard for international action.”

recruited by the Coalition for International Justice, made up the team.

During July and August of 2004, the team conducted 1,136 interviews of displaced Darfuris in Chad, working in 19 informal settlements and UNHCR (United Nations High Commissioner for Refugees) refugee camps. Both the camp sectors and the interviewees were randomly selected, to ensure a representative sample; one refugee was chosen from every tenth dwelling unit in a sector. To maintain the interviewees’ privacy, the only other people present were the interviewer and a translator. Because interviews were conducted in Chad, the results may not be fully representative of the much larger population of internally displaced persons (IDPs) in Darfur.

The members of the Atrocities Documentation Team needed to positively identify where incidents had occurred; a simple field atlas, comprising 10 laminated maps, proved to be the answer. Each map was gridded with numbered and lettered rows and columns, so that interviewers could record, for example, that a village in map 6, square B3 was burned — a system far more consistent than relying on village names, which are not universally used or known in the region. Interviewees had little trouble identifying familiar locations on the maps, having traversed the geographic features near their homes many times on foot.

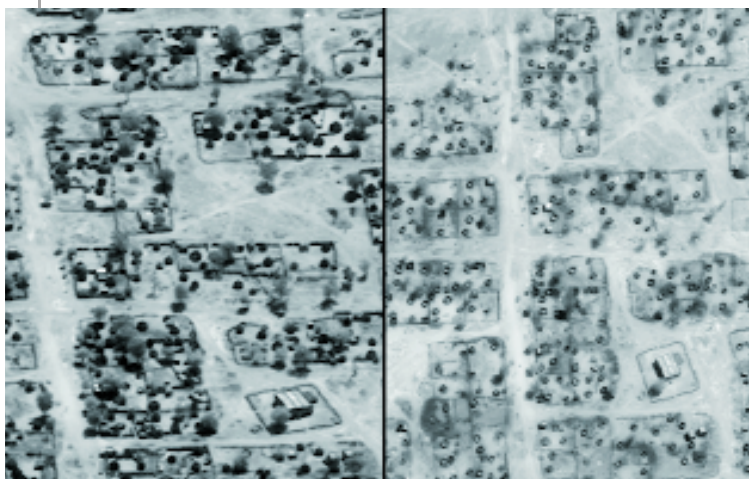
The atlas was produced by HIU, a federal inter-agency center that promotes best practices for humanitarian information management. Although it is housed

in the State Department, HIU also draws its employees from NGA, USAID, and the Department of Defense. The center collects and analyzes unclassified information to support humanitarian emergencies, distributing analytical products to nongovernment and academic organizations such as the UN. In Springer’s words, “it’s no good if you can’t share it.” In the case of Darfur, the HIU team working on the region’s issues facilitated the exchange of data on the damage and destruction of villages. HIU also assisted the team with data collection, compilation, and analysis.

Results of the interviews were recorded on paper, then compiled by INR. The field data were compiled with a standardized data entry process; each interviewee’s answers were coded, then aggregated and analyzed with a statistical program. The results were reported in State Department Publication Number 11182 — “Documenting Atrocities in Darfur” — published by INR and DRL. The report was released September 9, 2004, as part of then-Secretary of State Colin Powell’s testimony to the Senate Foreign Relations Committee on the Darfur crisis (see “The G-Word” sidebar).

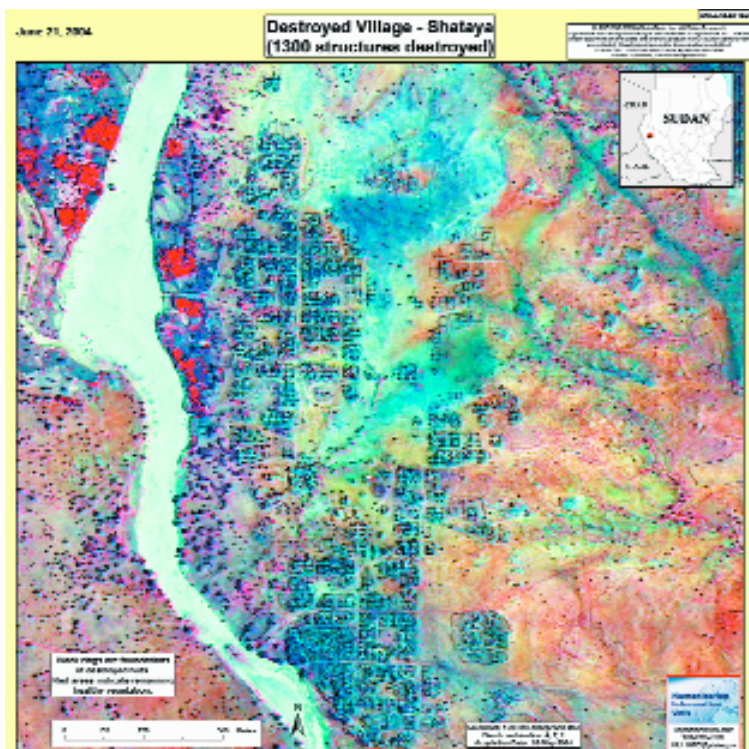
Three-quarters of the survey respondents reported that GOS military forces were involved in the raids; almost half reported that they were joined by Janjaweed forces. Nearly 90 percent of interviewees said there was no rebel activity in or near their village before it was attacked, and 91 percent said their village was not defended in any way against the raid.

COURTESY OF NGA



▲ FIGURE 2. The intact houses seen in a January 2004 (above left) view of a village in Shattay, Sudan, were razed to their foundations by March 2004 (above right).

COURTESY OF U.S. STATE DEPARTMENT, HUMANITARIAN INFORMATION UNIT



▲ FIGURE 3. This pan-sharpened image depicts not only the extent of destruction, but also the location of remaining healthy vegetation (red areas).

Many interviewees experienced the same type of attack: after GOS aircraft bomb the area, soldiers, Janjaweed, or both enter the village. When they try to escape, villagers are shot by ground troops and gunships. Usually, men and boys are killed, while women and girls are beaten and raped. Survivors of both genders are abducted; the men for mass execution, the women to be held in sexual slavery. Finally, the gunmen loot and burn the village. The theft or destruction of

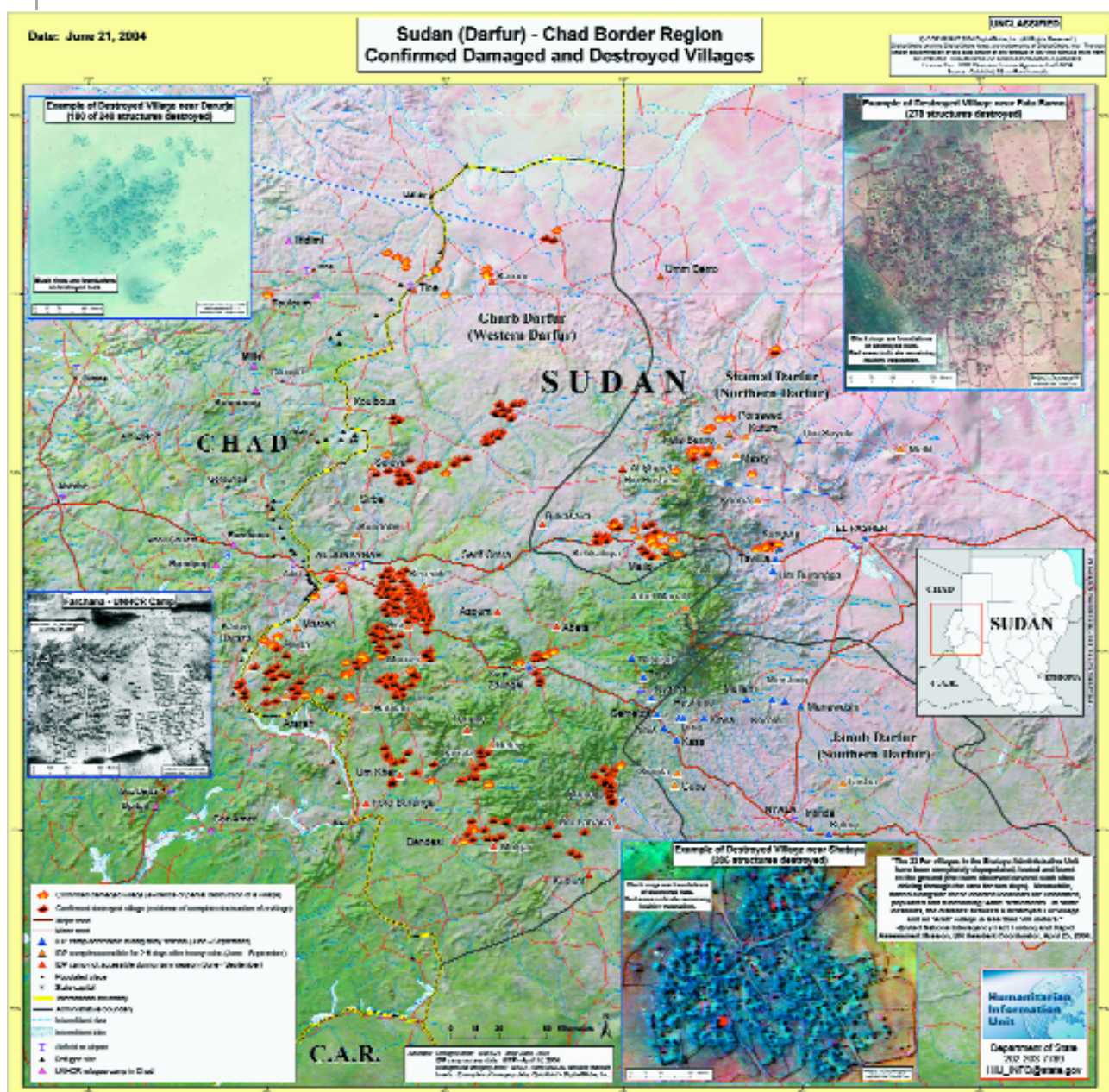
livestock, seed supplies, wells, and farming equipment render most who escape unable to feed themselves — and therefore fully dependent on humanitarian aid.

Satellites Bear Witness

The data from the interviews gave ground truth to that collected by remote sensing. Before-and-after images of destroyed villages show clusters of dwellings reduced to roofless foundations by bombing and burning (see Figure 2). The damage to vegetation is also clearly visible: with a band combination of 4-2-1, trees that are still bearing foliage show up red on infrared imagery, whereas scorched, leafless trees appear black (see Figure 3). In addition to indicating the location and extent of damage, imagery has also helped humanitarian aid organizations identify where refugee camps are located, plan the establishment of new camps, and determine where food drops can be made.

HIU combined data about damaged and destroyed villages with commercial imagery and displaced population information to create a series of maps and graphics titled “Sudan (Darfur)—Chad Border Region; Confirmed Damaged and Destroyed Villages.” The unit produced nine versions of the border-region map, requested by the State Department and USAID, between May 2004 and February 2005. In addition to Chad refugee camps and demolished villages, the map also indicates the spatial relationships of IDP camps, UNHCR camps, groundwater, roads, airfields, and healthy vegetation, as well as accessibility during the rainy season. Camp locations were provided by UNHCR, baseline data came from NGA, and the Army Corps of Engineers contributed hydrologic data. Additional data sources included the UN World Food Programme and the National Aeronautics and Space Administration.

Satellite input for the maps came from DigitalGlobe’s QuickBird imagery, purchased through the ClearView license, and government-owned satellites. The State Department assigned collection of the imagery to NGA in early spring of 2004. According to NGA Imagery Analyst Jim Goslee, QuickBird shot the regions requested in a formal tasking; the resulting imagery covered significant portions of Darfur, which is about the size of France. Pan-sharpening performed with ERDAS IMAGINE 8.6 combined 0.61-centimeter panchromatic and 4-meter multispectral into 1-meter multispectral imagery. At that resolution, tents can be counted in the refugee camps, but not individual people. The processed imagery was then brought into ArcInfo 8.3 Workstation to create distributable files, including PDFs



▲ **FIGURE 4.** HIU produced nine versions of the Sudan–Chad border-region map, incorporating locations of refugee camps and destroyed villages.

and a 30 × 30-inch JPEG poster (see Figure 4).

Natsios was among the government representatives to use these mapping products to brief the UN Security Council, UN Secretary-General Kofi Annan, and GOS as part of an effort to inform the international community about the enormity of the crisis. According to Springer, it was the first time that the State Department sent a cable to U.S. embassies containing a hyperlink to relevant maps and graphics on the department's e-Diplomacy Web site. In addition to diplomatic purposes, the products were used by the press, in such publications as *Time*; on the Senate floor;

and by human rights and relief organizations, including USAID's Office of Foreign Disaster Assistance and the Centers for Disease Control and Prevention (CDC).

Other HIU mapping projects included "USAID Priority Sites for IDP Protection in Darfur." In collaboration with UNHCR's Geographic Information Management Unit, HIU enhanced images of three Chad refugee camps — Mille, Iridimi, and Fardhana — with camp boundaries, tent locations, and management structures for use by UNHCR field staff (see Figure 5).

Hope for the Future

The presence of African Union peacekeeping troops and the emigration of villagers from their homes have decreased the number of civilians killed in recent months. Although a series of cease-fire agreements (first signed by GOS and rebel forces in April 2004) have been broken by both sides, a sixth round of peace talks between the two is scheduled for September 15.

Despite declining casualties from violence, however, starvation, disease, and the lack of security continue to endanger displaced Darfuris. The heavy rains of late May through late September disrupt food distribution efforts. Water-borne diseases such as cholera and dysentery are a greater threat during the wet season, when flooding turns some crowded camps into open sewers.

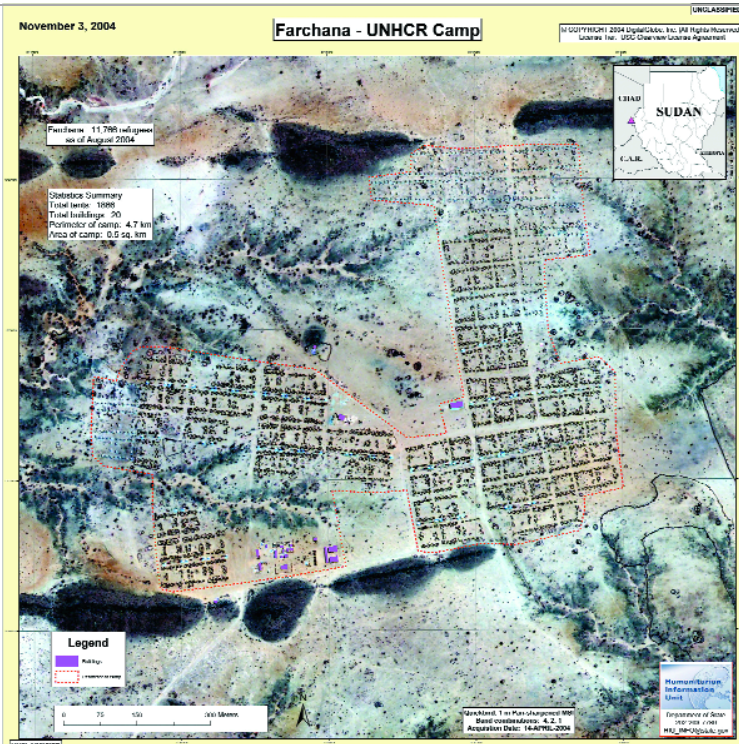
According to Ron Redmond, UNHCR spokesperson, "There are an estimated 60,000 to 70,000 internally displaced in camps around El Geneina. In all, about 2 million people are displaced in Darfur." Another 200,000 still live in the refugee camps in eastern Chad.

GOS has urged the refugees to return to their homes, but those who venture outside camp compounds — even briefly, to collect wood for cooking fires — have suffered further assaults. It is often women that risk leaving camp, while men stay behind, fearing they will be killed; the women are more likely to be beaten, robbed, or raped instead. Some women brave longer excursions to tend crops in their villages, then return to the relative safety of camp.

As Powell remarked, "what is really needed is enough security so that [dislocated people] can go home. And what is really needed is for the [Janjaweed] to cease and desist their murderous raids against these people — and for the Government in Khartoum to stop being complicit in such raids."

Monitoring troops from the African Union have been too few, thus far, to effect much peacekeeping. GOS has agreed to allow greater numbers into the country; the African Union will increase the number of troops from approximately 2,700 to 7,700 by the end of September.

HIU's efforts to ameliorate the effects of the disaster through GIS continue. At the UNHCR GIS Workshop held in Cairo, Egypt, in March 2005, HIU demonstrated a prototype "Camp Management Tool" using ArcGIS 9.0. The tool is composed of DigitalGlobe QuickBird imagery overlaid with shapefiles of the individual buildings and tents, areas, and perimeters of 10 UNHCR camps in eastern Chad. UNHCR analysts can update the camp shapefiles as the camps grow. The tool was provided to UNHCR at the workshop, as well as to CDC analysts to assist



▲ **FIGURE 5.** HIU enhanced imagery of the Farchana refugee camp to assist UNHCR field staff.

in that agency's nutritional surveys. Although village chiefs sometimes wanted to dictate which refugees the analysts should interview, choosing certain tents ahead of time allowed CDC to override those decisions.

"This tool allowed CDC to do systematic random sampling for their surveys," said Springer. "It allowed the CDC analysts to know which tents they were going to survey before they arrived in the field. This gave . . . much more credibility to their methodology, and their results as well."

Ultimately, the crisis in Darfur requires far more assistance — and attention — from the international community than it has received thus far. According to UN figures, of the 3.2 million people affected by the conflict, only 1.9 million received food assistance in July. No matter what the future holds for Sudan, geointelligence will continue to educate government officials and the public, influence policy, and support humanitarian efforts in the region. 🌐

TO LEARN MORE, VISIT:

Embassy of Sudan: www.sudanembassy.org

Eric Reeves: www.sudanreeves.org

Humanitarian Information Unit: <http://hiu.state.gov>

National Geospatial-Intelligence Agency: www.nga.mil

UNHCR: www.unhcr.ch

USAID: www.usaid.gov